

WHAT IS CLAIMED IS

1. A bending method for producing a coil having return sections bent at 180° comprising:
 - providing a metallic pipe;
 - 5 setting up a tangency point where a bend will occur;
 - pre-heating the pipe where the bend will occur at a temperature of between 570° F to 2200° F for a time of between 30 seconds to 60 minutes;
 - 10 pre-bending the pre-heated pipe at 180° taking as bending reference point the tangency point in order to obtain a "U" shaped piece having two straight tube sections depending from a bent section;
 - heating the bent section at a temperature of between 570° F to 2200° F for a time between 1 to 60 minutes;
 - 15 forming a final bending radius by applying a lateral pushing force along a straight section respectively and a pushing force on the tangency point perpendicular to the lateral pushing forces; and
 - applying a compression force to the entire "U" shaped piece in order to round the sections until the required roundness is obtained.
2. A method as claimed in claim 1, wherein the pipe is made of a metallic material selected from the group consisting of: carbon steel, copper and its alloys, stainless steel, low alloy steel and aluminum.
- 20 3. A method as claimed in claim 1 wherein the metallic pipe is of the type selected from the group consisting of: welded or seamless, extruded, ribbed (splined).
4. A method as claimed in claim 1 wherein the pipe has a thickness ranging from schedule 40 to XXS.

5. A method as claimed in claim 1 wherein the pre-heating is carried out by using an oxi-gas torch.

6. A method as claimed in claim 1, wherein the pre-heating is applied at the tangency point plus approximately 2".

5 7. A method as claimed in claim 1, wherein the pre-bending is carried out by using conventional means which may comprise any bending tool.

8. A method as claimed in claim 1, wherein in the pre-bending step, the pipe is bent until a bending radius R/D of 1 to 3 is obtained; wherein R = bending radius and D = external tube diameter.

10 9. A method as claimed in claim 1, wherein the final bending radius is formed by using a special press having two lateral pressure elements, each applying a lateral pushing force along a straight section respectively, and a pressure element which applies a pushing force on the tangency point perpendicular to the lateral pushing forces.

15 10. A method as claimed in claim 1, wherein each lateral pushing force is applied along a straight section for a distance of approximately 12" from the bent section.

11. A method as claimed in claim 1, wherein each step of the process is repeated until all the required return sections of the coil are formed.

20 12. A tubular cooling element comprising a coil having straight pipe sections and "U" shaped 180° elbow sections formed from a pipe having a wall thickness ranging from schedule 40 to XXS and wherein the coil does not have welded 180° elbows since the return sections are integral part of the pipe.